

### 3. CHEMICAL AND PHYSICAL INFORMATION

#### 3.1 CHEMICAL IDENTITY

Table 3-1 lists common synonyms, trade names, and other pertinent identification information for tin and representative inorganic tin and organotin compounds.

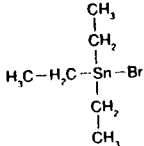

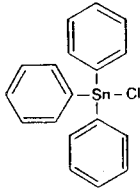
#### 3.2 PHYSICAL AND CHEMICAL PROPERTIES

Table 3-2 lists important physical and chemical properties of tin and representative inorganic tin and organotin compounds.

TABLE 3-1. Chemical Identity of Tin and Compounds<sup>a</sup>

Characteristic	Tin	Stannous chloride	Stannic oxide	Dibutyltin chloride
Synonyms	Metallic tin; silver mat powder; tin flake	Tin salt; tin crystals; tin proto-chloride <sup>b</sup>	Stannic anhydride; tin peroxide; stannic acid <sup>b</sup>	Dibutyltin chloride dichlorodibutyltin; dichlorodibutylstannane
Trade name	No data	No data	No data	No data
Chemical formula	Sn	SnCl <sub>2</sub> <sup>c</sup>	SnO <sub>2</sub> <sup>c</sup>	C <sub>8</sub> H <sub>18</sub> Cl <sub>2</sub> Sn
Chemical structure	Sn <sup>d</sup>	SnCl <sub>2</sub> <sup>d</sup>	SnO <sub>2</sub> <sup>d</sup>	$\begin{array}{c} \text{Cl} \\   \\ \text{H}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}-\text{Sn}-\text{CH}_2\text{CH}_2-\text{CH}_2\text{CH}_3 \\   \\ \text{Cl} \end{array}$
Identification numbers:				
CAS Registry	7440-31-5	7772-99-8 <sup>e</sup>	18282-10-5 <sup>f</sup>	683-18-1
NIOSH RTECS	XP7320000 <sup>g</sup>	XP8700000 <sup>g</sup>	XQ4000000 <sup>h</sup>	WH7100000 <sup>g</sup>
EPA Hazardous Waste	No data	No data	No data	No data
OHM/TADS	No data	7216909 <sup>h</sup>	No data	No data
DOT/UN/NA/IMCO Shipping	No data	NA1759 <sup>h</sup>	No data	No data
HSDB	5035 <sup>h</sup>	0582 <sup>h</sup>	5064 <sup>h</sup>	6071 <sup>h</sup>
NCI	No data	No data	No data	No data

TABLE 3-1 (Continued)

Characteristic	Tributyltin oxide	Triethyltin bromide	Trimethyltin chloride	Triphenyltin chloride
Synonyms	TBTO; bis(tributyltin) oxide; oxybis (tributyltin)	Stannane, bromomtriethyl-	Chlorotrimethyl stannane; chlorotrimethyltin; trimethyl chlorotin	Chlorotriphenyltin; triphenylchloro- stannane
Trade name	No data	No data	No data	No data
Chemical formula	$C_{24}H_{54}OSn_2$	$C_6H_{13}BrSn$	$C_3H_7ClSn$	$C_{18}H_{15}ClSn$
Chemical structure	$(H_3CCH_2CH_2CH_2)_3SnOSn(CH_2CH_2CH_2CH_3)_3$			
Identification numbers:				
CAS Registry	56-35-9	2767-54-6	1066-45-1	639-58-7
NIOSH RTECS	JN8750000*	WH6740000*	WH6850000*	WH6860000*
EPA Hazardous Waste	No data	No data	No data	No data
OHM/TADS	No data	No data	No data	No data
DOT/UN/NA/IMCO Shipping	No data	No data	No data	No data
HSDB	No data	No data	No data	No data
NCI	No data	No data	No data	No data

\*All information obtained from WHO 1980, except where noted.

\*Windholz 1983

\*Weast 1985

\*Buckingham 1982

\*Sax 1984

\*Sax and Lewis 1987

\*Sitting 1985

\*HSDB 1989

CAS = Chemical Abstracts Service; DOT/UN/NA/IMCO = Department of Transportation/United Nations/North America/International Maritime Dangerous Goods Code; EPA = Environmental Protection Agency; HSDB = Hazardous Substances Data Bank; NCI = National Cancer Institute; NIOSH = National Institute for Occupational Safety and Health; OHM/TADS = Oil and Hazardous Materials/Technical Assistance Data System; RTECS = Registry of Toxic Effects of Chemical Substances

TABLE 3-2. Physical and Chemical Properties of Tin and Compounds\*

Property	Information			
	Tin	Stannous chloride	Stannic oxide	Dibutyltin dichloride
Molecular weight	118.69 <sup>c</sup>	189.60 <sup>b</sup>	150.69 <sup>b</sup>	303.85
Color	White or gray <sup>b</sup>	White <sup>b</sup>	White <sup>b</sup>	White
Physical state	Solid <sup>b</sup>	Solid <sup>b</sup>	Solid <sup>b</sup>	Solid
Melting point	231.88°C <sup>b</sup>	246°C <sup>b</sup>	1,630°C <sup>b</sup>	43°C
Boiling point	2,260°C <sup>b</sup>	652°C <sup>b</sup>	1,800-1,900°C (subl.) <sup>b</sup>	135°C at 10 mmHg
Density at 20°C	7.28 <sup>b</sup>	3.95 <sup>b</sup>	6.95 <sup>b</sup>	1.36
Odor	No data	No data	No data	No data
Odor threshold:				
Water	No data	No data	No data	No data
Air	No data	No data	No data	No data
Solubility:				
Water	Insoluble <sup>b</sup>	839,000 mg/L at 0°C <sup>b</sup>	Insoluble <sup>b</sup>	Soluble in hot water
Organic solvents	Soluble in hydrochloric and sulfuric acids <sup>b</sup>	Soluble in alcohol, ether, acetone <sup>b</sup>	No data	Soluble in ether, benzene, alcohol <sup>d</sup>
Partition coefficients:				
Log octanol/water	No data	No data	No data	No data
Log K <sub>ow</sub>	No data	No data	No data	No data
Vapor Pressure	No data	No data	No data	2 mmHg at 100°C
Henry's law constant	No data	No data	No data	No data
Autoignition temperature	No data	No data	No data	No data
Flashpoint	No data	No data	No data	335°F (168°C) (open cup)
Flammability limits	No data	No data	No data	No data
Conversion factors	Not applicable	Not applicable	Not applicable	Not applicable
Explosive limits	No data	No data	No data	No data

TABLE 3-2 (Continued)

Property	Information			
	Tributyltin oxide	Triethyltin bromide	Trimethyltin chloride	Triphenyltin chloride
Molecular weight	596.16	285.81	199.26	385.47
Color	Colorless <sup>c</sup>	Colorless	No data	Colorless
Physical state	Liquid <sup>c</sup>	Liquid	Solid	Solid
Melting point	No data	-13.5°C	37°C	106°C
Boiling point	180°C at 2 mmHg <sup>c</sup>	224°C	No data	240°C at 13.5 mmHg
Density at 20°C	No data	1.630 g/mL	No data	No data
Odor	No data	No data	No data	No data
Odor threshold:				
Water	No data	No data	No data	No data
Air	No data	No data	No data	No data
Solubility:				
Water	Slightly soluble <sup>c</sup>	No data	No data	Insoluble
Organic solvents	Soluble <sup>c</sup>	Soluble	No data	Soluble
Partition coefficients:				
Log octanol/water	No data	No data	No data	No data
Log K <sub>oc</sub>	No data	No data	No data	No data
Vapor Pressure	No data	No data	No data	No data
Henry's law constant	No data	No data	No data	No data
Autoignition temperature	No data	No data	No data	No data
Flashpoint	No data	211°F (99°C) (closed cup) <sup>e</sup>	207°F (97°C) (closed cup) <sup>e</sup>	No data
Flammability limits	No data	No data	No data	No data
Conversion factors	Not applicable	Not applicable	Not applicable	Not applicable
Explosive limits	No data	No data	No data	No data

<sup>a</sup>All information obtained from Sax 1984, except where noted.

<sup>b</sup>Weast 1985

<sup>c</sup>Sax and Lewis 1987

<sup>d</sup>HSDB 1989

<sup>e</sup>Aldrich 1988

